

## REVIEWS

*The object of this department of the Journal is to issue, as promptly as possible, critical digests of all Journal articles that bear upon any phase of Physical Chemistry.*

### General

**Investigations on the atomic weight of tellurium.** *G. Pellini. Gazz. chim. Ital.* 32, I., 131 (1902). — From the oxidation of tellurium the author obtains the value  $\text{Te} = 127.65$ . From the reduction of the oxide to tellurium, there is obtained the value  $\text{Te} = 127.62$ . The single determinations vary from 127.30 to 128.05. W. D. B.

**A redetermination of the atomic weight of lanthanum.** *H. C. Jones. Am. Chem. Jour.* 28, 23 (1902). — From an analysis of the sulphate, the author deduces an atomic weight for lanthanum of 138.77. This value has been questioned by Brauner (7, 222). W. D. B.

**A thermochemical constant.** *F. W. Clarke. Jour. Am. Chem. Soc.* 24, 882; *Zeit. anorg. Chem.* 33, 45 (1902). — The author finds the following equation to hold for a number of aliphatic hydrocarbons and their non-oxygenated derivatives.

$$\frac{4K}{12a + 6b - c - 8n} = \text{const.}$$

In this formula  $4K$  is the heat of combustion, all the initial and final substances being in the gaseous state;  $a$ , is the number of molecules of  $\text{CO}_2$  produced;  $b$ , the number of molecules of water;  $c$ , the number of oxygen molecules dissociated; and  $n$ , the number of atomic unions or linkings in the compound burned. The 'constant' has the value 13,773 cal, agreeing very closely with the heat of neutralization of strong bases by strong acids. The following general law is suggested: "In any class of compounds, the heat of formation is proportional to the number of atomic linkings within the molecule and seems to bear no relation to the masses of the atoms which are combined." W. D. B.

**Electro-affinity as a basis for the systematization of inorganic compounds.** *R. Abegg and G. Bodländer. Am. Chem. Jour.* 28, 220 (1902). — A reply to Locke (6, 442). W. D. B.

**The electro-affinity theory of Abegg and Bodländer.** *J. Locke. Am. Chem. Jour.* 28, 403 (1902). — A reply to Abegg and Bodländer (preceding review). W. D. B.

**The teaching of electrochemistry.** *S. Cannizzaro. Rend. Accad. Lincei* (5) 10, II., 163 (1901). — A paper in which the author expresses his belief that electrochemistry is a branch of chemistry and should be taught by a chemist and not by a physicist or an engineer. W. D. B.

**A university course in electrochemistry.** *J. W. Richards. Trans. Am. Electrochemical Soc.* 1, 41 (1903). — An outline of a four-year course in electrochemistry. The author starts with the course in metallurgy as given at Lehigh University and modifies it so as to include the fundamentals of electrical engineering, also adding lectures and laboratory work in specific electrochemical subjects. *W. D. B.*

**The theory and practice of continuous flow calorimetry.** *H. T. Barnes. Trans. Am. Electrochemical Soc.* 2, 197 (1902). — The author describes a simple form of vacuum-jacketed continuous flow calorimeter, the constant for the apparatus being determined from an experiment with water. Unfortunately the method requires one to two liters of liquid. *W. D. B.*

**On a means of stirring the liquid in a closed vessel and on a modification of a thermo-calorimeter.** *G. Guglielmo. Rend. Accad. Lincei* (5) 11, I., 298 (1902). — The author claims that he was the first, in 1892, to use a piece of iron and a magnet as a means of stirring a liquid in a sealed tube. He now points out that efficient stirring can also be obtained by whirling the tube first in one direction and then in the other, provided there be something inside the tube to churn the contents. It is claimed that the bad results of Favre and Silbermann with the mercury calorimeter were due to inefficient stirring, and the author suggests the use of a benzene calorimeter as being more sensitive. *W. D. B.*

**A novel constant high temperature bath.** *C. Baskerville. Jour. Am. Chem. Soc.* 24, 1025 (1902). — The bath is porcelain-lined and holds a fusible alloy as liquid. The regulation of the temperature is done by means of a float. No figures are given as to the constancy of temperature attained. *W. D. B.*

#### *One-Component Systems*

**On the distinction between polymorphism and chemical isomorphism.** *G. Bruni. Rend. Accad. Lincei* (5) 11, I., 386 (1902). — A discussion of the difference to be drawn between polymorphism (physical isomerism) and chemical isomerism. The conclusion is that we have chemical isomerism if any mixture of the two forms shows any sign characteristic of a two-component system. *W. D. B.*

**Arsenic pentachloride.** *C. Baskerville. Jour. Am. Chem. Soc.* 24, 1070 (1902). — Arsenic chloride takes up chlorine at low temperatures, forming the pentachloride which freezes at about  $-38^{\circ}$ . *W. D. B.*

**On the specific heats and heat of vaporization of the paraffin and methylene hydrocarbons.** *C. F. Mabery and A. H. Goldstein. Am. Chem. Jour.* 28, 66 (1902). — The authors have determined the specific heats of a number of pure hydrocarbons and of some crude oils. They have also measured the heat of vaporization of hexane, heptane, octane, hexamethylene, dimethyl pentamethylene, methyl hexamethylene, and dimethyl hexamethylene. *W. D. B.*

**On the testing of carbon electrodes.** *F. A. J. Fitzgerald. Trans. Am. Electrochemical Soc.* 2, 43 (1902). — The porosity is defined as the difference between the real and the apparent densities, divided by the real density. The

real density is determined in kerosene, pumping the air out of the electrode. The porosity is greatest at the center of the electrode. In the Acheson graphite electrode studied, the average porosity as defined was 0.26. The real density was 2.19. Special experiments by the Berthelot method showed that the Acheson graphite contains no amorphous carbon.

W. D. B.

**Physico-chemical investigations in the pyridine series.** *E. J. Constan and J. White. Am. Chem. Jour.* 29, 1 (1903). — The authors studied pyridine,  $\alpha$ -picoline and  $\beta$ -picoline. They draw the following conclusions —

1. The regularity in the increase of the heats of combustion between homologues, observed in the aliphatic and aromatic series extends also to the pyridine compounds, being found equal to 156 cal for each  $\text{CH}_2$ .

2. The heat of formation of pyridine and its homologues can be approximately calculated from the formula,

$$\text{C}_n\text{H}_{2n-5}\text{N} = -51.7 \text{ cal} + 7n \text{ cal.}$$

3. Trouton-Schiff's rule,  $\text{MH}/T = \text{const}$ , holds good for the pyridine series also.

4. The affinities of pyridine and the picolines are of approximately the same order as that of *p*-toluidine.

W. D. B.

**On the alleged change of the properties of aluminum.** *P. Spica. Gazz. chim. Ital.* 31, II., 67 (1901). — Le Bon has claimed that the properties of mercury, magnesium, and aluminum can be modified profoundly by the addition of small quantities of other substances. In the case of aluminum, mercury is the substance to be added. The author shows that the peculiar properties of aluminum amalgam have long been known, that they are not so peculiar as Le Bon has maintained, and that they are easily explicable.

W. D. B.

#### Two-Component Systems

**On the nature of mercuric iodide in solution.** *J. H. Kastle and J. V. Reed. Am. Chem. Jour.* 27, 209 (1902). — Supersaturated solutions of mercuric iodide in naphthalene do not crystallize at  $100^\circ$  when the red crystals of mercuric iodide are added to the solution. There is a heavy crystallization when the yellow modification is added. From this the authors conclude that mercuric iodide exists in solution as the yellow form. While no solvent is known which changes the inversion temperature for the red and yellow mercuric iodide, the rate of change varies markedly with the solvent, the viscosity being one of the determining factors. Under vaseline, yellow crystals have been kept for more than a year.

W. D. B.

**A contribution to the electrochemistry of barium compounds.** *M. M. Haff. Trans. Am. Electrochemical Soc.* 2, 267 (1902). — Tabulated determinations of specific gravity of barium hydroxide solutions at  $80^\circ$  and of solubilities from  $0^\circ$  to  $80^\circ$ .

W. D. B.

**Saturated solutions of salts of analogous series.** *C. Rossi. Gazz. chim. Ital.* 31, II., 502 (1901). — The author finds that at some temperatures the ratios of the molecular solubilities of some anhydrous analogous salts are whole numbers (Cf. 6, 499). On this he bases speculations.

W. D. B.

**On the relation between solubility and heat of solution.** *A. Campetti. Rend. Accad. Lincei (5) 11, II., 99 (1901).*—The author finds that the van't Hoff formula for the relation between the change of solubility with the temperature and the heat of solution, holds better in the case of urea and of mannite solutions when the concentrations are expressed in grams per hundred grams of water than when expressed in grams per hundred cubic centimeters.

*W. D. B.*

**On some uncertainties in the application of the periodic law.** *N. Tarugi and Q. Checchi. Gazz. chim. Ital. 31, II., 417 (1901).*—The author discusses argon, the peroxides, and tellurium; and then shows from experiments of his own that the solubilities of the cinnamates and salicylates of magnesium, calcium, strontium, barium, and mercury appear not to follow any law of periodicity.

*W. D. B.*

**Cryoscopic experiments with the bromides of arsenic and antimony.** *F. Garelli and V. Bassani. Rend. Accad. Lincei (5) 10, I., 255 (1901).*—Experiments with benzene, bromoform, iodine, iodide of arsenic point to 194 as the freezing-point constant for  $\text{AsBr}_3$ . Antimony tribromide causes a rise of freezing-point. The authors conclude that the corresponding constant for  $\text{SbBr}_3$  is 267 as found by Tolloczko, though they criticise some of his conclusions.

*W. D. B.*

**Cryoscopic measurements with methylene iodide.** *F. Garelli and V. Bassani. Gazz. chim. Ital. 31, I., 407 (1901).*—Experiments with ethylene bromide, benzene and iodine pointed to a constant, 140, for methylene iodide. Stannic iodide, arsenic tri-iodide, mercuric iodide, and antimony tri-iodide gave practically normal values. The behavior of sulphur points to a molecular weight of 256,  $\text{S}_8$ . In all the cases, the apparent molecular weight varies less with the concentration when the concentrations are expressed in grams per 100 cc of solution than when they are expressed in grams per 100 g of solvent. The constant, 140, refers to the second or usual method.

*W. D. B.*

**Phosphorus oxychloride as cryoscopic solvent.** *G. Oddo. Rend. Accad. Lincei (5) 10, I., 452; Gazz. chim. Ital. 31, II., 138 (1901).*—From experiments with carbon tetrachloride, toluene, sulphur monochloride, and bromine the author deduces the value 69 for the freezing-point constant of phosphorus oxychloride. Aniline hydrochloride, pyridine hydrochloride, ferric chloride ( $\text{FeCl}_3$ ), platinum tetrachloride and gold trichloride give values approximating those to be expected if the molecular weight were half the formula weight.

*W. D. B.*

**Solid solutions and isomorphous mixtures in saturated and unsaturated compounds with open chains.** *G. Bruni and F. Gorni. Gazz. chim. Ital. 31, I., 48 (1901).*—Reviewed (5, 322) from *Rend. Accad. Lincei (5) 9, II., 151 (1900).*

**On the properties of nitrogen peroxide as solvent.** *G. Bruni. Gazz. chim. Ital. 32, I., 187 (1902).*—A statement of priority as against Frankland and Farmer (6, 519).

*W. D. B.*

The lowering of the freezing-point of water produced by concentrated solu-

tions of certain electrolytes, and the conductivity of such solutions. *H. C. Jones and F. H. Getman. Am. Chem. Jour.* 27, 433 (1902). — Preliminary measurements with a large number of electrolytes. In nearly every case, the molecular lowering of the freezing-point passes through a minimum with increasing concentration. The molecular conductivities, on the other hand, decrease regularly with increasing concentration. *W. D. B.*

**On the two monochlorides of iodine.** *G. Oddo. Rend. Accad. Lincei* (5) 10, II., 54; *Gazz. chim. Ital.* 31, II., 146 (1901). — Cryoscopic experiments with  $\text{ICl}_2$  dissolved in  $\text{POCl}_3$  showed a molecular weight varying from 161.7 to 168.7. There is therefore no polymerization. It was not possible to keep the  $\beta$ -modification long enough to make any determinations with it. *W. D. B.*

**On iodine trichloride.** *G. Oddo. Rend. Accad. Lincei* (5) 10, II., 116; *Gazz. chim. Ital.* 31, II., 151 (1901). — Iodine trichloride in phosphorus oxychloride gives molecular weights lower than the formula weights. The author accounts for this by assuming electrolytic dissociation into  $\text{Cl}_2\text{I}^+$  and  $\text{Cl}^-$ . It must be stated that there is an enormous experimental error in the author's work, two successive determinations with the same concentration giving molecular weights of 134 and 165. In water the apparent molecular weight of iodine trichloride is about 45. The author offers no explanation for this. In water two successive series differ by about ten percent. *W. D. B.*

**On sulphuric and disulphuric anhydride.** *G. Oddo. Rend. Accad. Lincei* (5) 10, II., 207; *Gazz. chim. Ital.* 31, II., 158 (1901). — From freezing-point experiments in phosphorus oxychloride, the author finds that the sulphur trioxide which melts at  $14.8^\circ$  has the formula  $\text{SO}_3$ , while the so-called solid trioxide has the formula  $\text{S}_2\text{O}_6$ . While sulphuric anhydride chars organic matter at once, this is not the case with the disulphuric anhydride. Neither anhydride reacts with metals or with oxides when perfectly dry. The dimeric form changes into the other with evolution of heat. *W. D. B.*

**On compounds of sulphur dioxide with salts.** *P. Walden and M. Centnerszwer. Zeit. phys. Chem.* 42, 432 (1903). — The melting-point of sulphur dioxide is found to be  $-72.7^\circ$ . Below  $0^\circ$  a yellow compound,  $\text{KI}(\text{SO}_2)_4$ , with a melting-point of  $+0.26^\circ$  crystallizes from solutions of KI in  $\text{SO}_2$ . At lower temperatures ( $-60^\circ$ ) a yellow compound,  $\text{KI}(\text{SO}_2)_{14}$ , with a melting-point  $-23^\circ$  separates from the solutions. From vapor tension measurements, which are admitted to be somewhat unsatisfactory, the authors argue in favor of the non-existence of the compound of the formula  $\text{KI}(\text{SO}_2)$ . The upper limits of the existence of solutions of KI in  $\text{SO}_2$  are determined by investigating equilibria at higher temperatures. Cryoscopic determinations indicate that in 0.4 normal solutions in water, the complex compounds of KI with  $\text{SO}_2$  and of KCNS with  $\text{SO}_2$  are decomposed to a great extent, which was to have been expected from the known affinity of these salts and of  $\text{SO}_2$  for water. In concentrated solutions of  $\text{RbI}$ ,  $\text{N}(\text{CH}_3)_4\text{I}$ , KI, KCNS, KBr, resorcine, and KCl in water,  $\text{SO}_2$  is more soluble than in water; the solubility diminishes in the solutions of these compounds in the order named. In aqueous solution of NaCl,  $\text{SO}_2$  is less soluble than in water. The authors argue that these complex compounds also

exist in the  $\text{SO}_2$  solutions of these salts; in other words, they favor the hydrate theory in this case. However, they point out that the combination of the salt with several molecules of the solvent would not change the number of the solute molecules, and so, according to the osmotic theory of solutions, would not influence the boiling- or freezing-point of the solutions. Concerning the abnormally high molecular weights which they have found for KI in  $\text{SO}_2$  solutions (395 and 193 when one gram-mol. is contained in 1 liter and 16 liters respectively, in spite of the fact that the solutions are excellent electrolytes) the authors state that they have no explanation, as the assumption that the above-named complex compounds exist in the solutions is unable to clear up the "deviations from the osmotic law". In the final summary, it is stated that polymerization of the salt molecules in the solutions *must* be considered as the main cause of the deviations from the requirements of the osmotic theory.

The reviewer would add that there are no facts whatever upon which to base the assumption of such polymerization, the assumption being made solely to save at all hazards the osmotic theory of solutions and the theory of electrolytic dissociation. The behavior of the  $\text{SO}_2$  solutions constitutes a strong argument against these theories; and this behavior is readily explained on the basis of the older view that in solutions the whole of the solvent is bound to the whole of the solute by ties of affinity that are chemical in character. L. K.

**New studies on solid solutions.** *G. Bruni. Rend. Accad. Lincei (5) 11, II., 187 (1902).*—In dimethyl succinate, as solvent, dimethyl malate, tartrate and racemate give normal values, while hydrobenzoin and isohydrobenzoin form solid solutions. Somewhat too high values are obtained for *p*-tolylhydroxylamine and *p*-cresol in *p*-toluidine and for  $\alpha$ -naphthylhydroxylamine in  $\alpha$ -naphthylamine. Solid solutions certainly occur with  $\alpha$ -naphthol in  $\alpha$ -naphthylamine with *s*-tribromaniline in *s*-tribromphehol, and with  $\text{C}_6\text{H}_5\text{CHO.N.C}_6\text{H}_5$  in azoxybenzene. A number of other cases of solid solutions were studied, the chemical similarity of solvent and solute being always the deciding factor. W. D. B.

**On the nature and properties of colloidal solutions.** *G. Bruni and N. Pappadà. Gazz. chim. Ital. 31, I., 244 (1901).*—Colloidal silicic acid, ferric hydroxide, chromic hydroxide, Prussian blue, and egg albumen do not pass through a membrane and do not change the freezing-point of water at all. Dextrine and molybdic acid do diffuse through a membrane, though slowly, and do lower the freezing-point of water. The second group, therefore, form true solutions, the solutes being highly polymerized. Substances of the first group are to be considered as in suspension only, and it is these substances which coagulate. W. D. B.

**On the formation of mix-crystals by sublimation.** *G. Bruni and M. Padoa. Rend. Accad. Lincei (5) 11, I., 565; Gazz. chim. Ital. 32, II., 319 (1902).*—When azobenzene and stilbene are sublimed together, homogeneous crystals are obtained which contain both components. The same thing occurs when mercuric iodide and bromide are sublimed together. W. D. B.

**Some new methods for determining the molecular weight of substances in dilute solutions.** *G. Guglielmo. Rend. Accad. Lincei (5) 10, II., 232 (1901).*

—The new methods are modifications of the wet and dry bulb hygrometers. No figures are given to show the accuracy of the methods proposed.

W. D. B.

**Determination of molecular weight of volatile substances by the boiling-point method.** *G. Oddo. Rend. Accad. Lincei (5) 11, I., 12 (1902).* — The author has determined the boiling-points of solutions of iodine in benzene and has determined the amount of iodine in the vapor by distilling off some of the solution and analyzing. His results differ markedly from those of Beckmann and Stock. The discrepancy is probably due to the methods of distillation. The author observed no precautions.

W. D. B.

**Determination of molecular weight of volatile substances by the boiling-point method.** *G. Oddo. Gazz. chim. Ital. 31, II., 222 (1901); Rend. Accad. Lincei (5) 11, I., 130 (1903).* — Even after applying corrections for the volatility of the solute, the author finds abnormally high values for phosphorus oxychloride in carbon tetrachloride and benzene, but normal values in chloroform. Normal values were obtained for phosphorus oxybromide in benzene, thionyl chloride in chloroform, sulphur monochloride in benzene and in carbon tetrachloride. High values were found for phosphorus sulphochloride in benzene. The accuracy of the author's correction for volatility has been disputed by Ciamician, who attributes the apparent polymerization to experimental error.

W. D. B.

**On the polymerization of some inorganic oxychlorides.** *G. Ciamician. Rend. Accad. Lincei (5) 10, II., 221 (1901); Gazz. chim. Ital. 32, I., 254 (1902).* — Oddo (4, 406) believed that phosphorus oxychloride polymerized in boiling benzene. The author shows that this apparent result is to be ascribed to the volatility of the oxychloride (preceding review). The values are practically normal when a correction is made for the partial pressure of the solute.

W. D. B.

**A probable cause of the different colors of iodine solutions.** *A. Lachmann. Jour. Am. Chem. Soc. 25, 50 (1903).* — Previous investigators have found four sets of colors for iodine solutions: violet, red, red-brown, brown. The author finds that the intermediate shades are due to traces of impurity in the solution. Working with pure solvents, there are only violet or brown solutions. From experiments with sixty-one solvents, the author draws the conclusion that saturated solvents give violet solutions and that brown solutions are formed in solvents which have an unsaturated character. The explanation is offered that addition products are formed to some extent. It is not necessary to assume that all the iodine is present as addition product, since addition of three percent of alcohol to an iodine-chloroform solution gives as dark a brown as can be obtained with pure alcohol.

W. D. B.

**An apparatus for continuous vacuum distillation.** *C. F. Mabery. Am. Chem. Jour. 29, 171 (1903).* — A description of a form of apparatus which has proved serviceable in the separation of petroleum fractions with high boiling-points.

W. D. B.

## Multi-Component Systems

**An investigation of ammonio-silver compounds in solution.** *W. R. Whitney and A. C. Melcher. Jour. Am. Chem. Soc.* 25, 69 (1903). — From transference experiments, freezing-point determinations, conductivity measurements and solubility tests, the authors conclude that the ammonio-silver compounds contain the complex cation  $\text{Ag}(\text{NH}_3)_2$ . *W. D. B.*

**On chemical equilibrium between acid salts and sparingly soluble salts.** *G. Magnanini. Gazz. chim. Ital.* 31, II., 542 (1901). — The solubility of acid potassium tartrate is increased by the addition of acid potassium sulphate and decreased by the addition of acid potassium oxalate. The solubility of mono-calcium phosphate is increased by addition of acid potassium tartrate. The solubility of calcium sulphate is increased by addition of acid potassium tartrate or tartaric acid and is decreased by alcohol. The solubility of calcium tartrate is increased by tartaric acid and decreased by alcohol. *W. D. B.*

**On the oxychlorides of mercury.** *N. Tarugi. Gazz. chim. Ital.* 31, II., 313 (1901). — The results of the author's investigations seem to be that the compounds  $2\text{HgCl}_2\text{HgO}$ ,  $\text{HgCl}_2\text{HgO}$ ,  $\text{HgCl}_2\cdot 2\text{HgO}$ ,  $\text{HgCl}_3\text{HgO}$ , and  $\text{HgCl}_4\text{HgO}$  as prepared by other people, are not true compounds, but that the compounds  $\text{HgCl}_2\text{HgO}$ ,  $\text{HgCl}_2\cdot 2\text{HgO}+$  and  $\text{HgCl}_3\text{HgO}$ , as prepared by himself, are real compounds. *W. D. B.*

**The lowering of the freezing-point of aqueous hydrogen dioxide produced by certain salts and acids.** *H. C. Jones and C. G. Carroll. Am. Chem. Jour.* 28, 284 (1902). — The lowering of the freezing-point of hydrogen peroxide solutions by the addition of salts is less than when the salts are added to pure water, while the reverse is the case when acids are added. The authors assume that the salts form addition products while the acids are more highly dissociated. *W. D. B.*

**On the existence of racemic substances in solution.** *G. Bruni and M. Podoa. Rend. Accad. Lincei* (5) 11, I., 212; *Gazz. chim. Ital.* 32, I., 503 (1902). — The authors experimented with the dimethyl esters of diacetyl tartrate and racemate in different solvents. With the racemate alone, the result of freezing-point measurements pointed to the existence of tartrates alone in the solution. On addition of an excess of tartrate, the apparent molecular weight rose, indicating a partial formation of racemate in solution. *W. D. B.*

**On heterogeneous equilibria in mixed crystals of hydrated isomorphous salts.** *G. Bruni and W. Meyerhoffer. Rend. Accad. Lincei* (5) 11, I., 185 (1902). — A discussion of the equilibria between two salts, each of which forms two or more hydrates, the corresponding hydrates of the two salts being isomorphous. *W. D. B.*

**The periodic system and the properties of inorganic compounds, IV.** *J. Locke. Am. Chem. Jour.* 27, 455 (1902). — The author has determined the solubilities of the double sulphates of the  $\text{M}_2\text{M}^{11}(\text{SO}_4)_2\cdot 6\text{H}_2\text{O}$  type. He finds in general that the effect of each univalent and each bivalent metal upon the solubility of the salts is a specific one, retained throughout all its compounds in

the series, and totally independent of its atomic weight. A quadratic formula was applicable for the "solubility increment".

W. D. B.

**Absorption of gases in organic solvents and in solutions of organic solvents.** *M. G. Levi. Gazz. chim. Ital.* 31, II., 513 (1901). — Experiments were made on the solubility of oxygen, methane, and ethylene in methyl alcohol and acetone; also on the solubility of nitrogen in methyl alcohol and in methyl alcohol solutions of potassium iodide and of urea of varying concentrations at 5°, 15°, and 25°. The formulas of Jahn applied fairly well to the solubility of nitrogen in the solutions.

W. D. B.

**The quantitative separation of hydrochloric and hydrocyanic acids.** *T. W. Richards and S. K. Singer. Am. Chem. Jour.* 27, 205 (1902). — Since hydrochloric acid is very much more dissociated than hydrocyanic acid, it was thought that it would be less volatile in dilute solutions. This proved to be the case and the authors distil off all the hydrocyanic acid, leaving all the hydrochloric acid behind.

W. D. B.

**On a method for the determination of very small vapor-tensions in certain circumstances.** *L. W. Andrews. Jour. Am. Chem. Soc.* 24, 864 (1902). — The author proposes to determine vapor-compositions by bubbling air through a solution, noting the loss in weight and determining the change in concentration. It is assumed that equilibrium conditions are easily reached.

W. D. B.

**The equilibrium between urea and ammonium cyanate.** *J. Walker. Zeit. phys. Chem.* 42, 207 (1902). — Fawsitt (7, 233) found that the equilibrium between ammonium cyanate and urea is displaced with rising temperature, more ammonium cyanate being formed, and he stated that this was contrary to the results of Walker. The author points out that Fawsitt has mis-stated Walker's results and that the two sets of observations are in absolute agreement.

W. D. B.

**On the hydrate of sulphuryl chloride and the unchanged solubility in water.** *G. Carrara. Gazz. chim. Ital.* 31, I., 450 (1901). — The hydrate of sulphuryl chloride, discovered by Baeyer and Villiger, melts at ordinary temperatures and is therefore not a factor in the rate of decomposition of sulphuryl chloride and water, as studied by the author in 1894. Baeyer and Villiger believe that sulphuryl chloride dissolves in water; but the author shows that this is wrong because in that case the conductivity of water which had been shaken with sulphuryl chloride should change with time, owing to the decomposition of the sulphuryl chloride. No such change can be observed.

W. D. B.

**Contributions to the study of starch-iodide.** *L. W. Andrews and H. M. Goettsch. Jour. Am. Chem. Soc.* 24, 865 (1902). — A careful study of some of the properties of starch iodide. The theoretical side of the paper is weak and the contention that "starch iodide" is an easily dissociating compound is certainly not proved.

W. D. B.

**A new separation of thorium from cerium, lanthanum, and didymium, and its application to the analysis of monazite.** *F. J. Metzger. Jour. Am. Chem. Soc.* 24, 901 (1902). —

1. A saturated solution of fumaric acid in 40 percent alcohol precipitates thorium completely from neutral solutions to which 40 percent of their volume of alcohol had been added, while under these conditions, the only other metals that give precipitation are zirconium, erbium, silver, and mercury.

2. This precipitation serves as an accurate and rapid separation of thorium from the other earths in monazite, and by its use the thoria can be determined in about one-third the time required by the methods now in use and with equal if not greater accuracy.

3. As the thorium-carbon ratio in thorium fumarate is 1 : 4, thorium and fumaric acid react molecule for molecule.

4. By the aid of a blast-lamp, white vapors were driven off from the thoria left in the boat after the combustion of thorium fumarate in a stream of oxygen (a fact as yet not explained).

5. Rare earth oxalates and thorium thiosulphates are completely converted into the hydroxides by heating to boiling in a strong solution of potassium hydroxide, giving a convenient method for the conversion of those salts into nitrates.

W. D. B.

**Reactions between acid and basic amides in liquid ammonia.** *E. C. Franklin and O. F. Stafford. Am. Chem. Jour.* 28, 83 (1902). — "The relation borne by the acid amides and the metallic amides towards liquid ammonia as a solvent is strikingly analogous to the well-known relations borne by the ordinary acids and bases to water.

"Metathetic reactions between many acid amides and potassium amide in solution in liquid ammonia take place with all the facility which marks the interaction of ordinary acids and bases in aqueous solution.

"Acid amides in solution in liquid ammonia attack potassium and sodium, and in some cases magnesium, with the evolution of hydrogen and the formation of the metallic derivatives of the acid amides."

Eighteen compounds were prepared by acting on acid amides in liquid ammonia with potassium, sodium, or magnesium amide.

W. D. B.

**A volumetric method for the estimation of sulphuric acid in soluble sulphates.** *Y. Nikaido. Jour. Am. Chem. Soc.* 24, 774 (1902). — The author titrates sulphates in a 50-60 percent alcohol solution with lead nitrate, using potassium iodide as an indicator. No reference is made to the work of Klein (5, 269).

W. D. B.

**Action of aluminum on salt solutions and on some fused salts.** *C. Formenti and M. Levi. Gazz. chim. Ital.* 32, I, 34 (1902). — Aluminum precipitates metal from the following solutions: antimony trichloride, bismuth nitrate, bismuth chloride, silver nitrate, copper chloride, copper nitrate, copper sulphate, cobalt chloride, nickel chloride, gold chloride, platinum chloride, palladium chloride, cadmium chloride, lead acetate, lead chloride, lead nitrate, lead chromate, tin chloride, cerium chloride, thorium sulphate, zirconium chloride, zirconium sulphate, thallium chloride, manganese chloride. With the fused chlorides of bismuth, copper, lead, tin, and manganese, and with fused cadmium iodide, aluminum reacts, forming an alloy. Aluminum acts on an aqueous solution of mercuric chloride, forming an amalgam, while hydrogen is set free.

W. D. B.

**Esterification by means of inorganic salts.** *G. Oddo. Gazz. chim. Ital.* 31, I., 285 (1901). — When alcohol is heated in a sealed tube with such salts as copper sulphate, ferric chloride, tin sulphate, or zinc chloride, ether is formed in amounts varying with the temperature and the nature of the salt. The author has made experiments with a large number of alcohols. He believes that there is an intermediate formation of an alcoholate and a sulphate or chloride, and that these react, forming the ether. Since he obtained no ether by heating alcohol with potassium ethyl sulphate, he believes that Williamson's explanation of the ether formation must be modified.

In the case of benzyl alcohol, the author gives a list of thirty salts which cause esterification, and of twenty salts which do not. Nickel chloride and zinc iodide cause a rapid condensation but with no formation of ether. The salts which cause etherification with one aromatic alcohol do not always have the same effect with another. W. D. B.

**On the relation between Kolbe's reaction and the cryoscopic behavior of phenols in benzene and other solvents containing no oxygen.** *G. Oddo and E. Mameli. Rend. Accad. Lincei* (5) 10, II., 240; *Gazz. chim. Ital.* 31, II., 244 (1901). — The authors find that Kolbe's reaction takes place most readily with those substances, like naphthol, which lose the  $\text{CO}_2$  most readily, in other words, with the substances with which the reaction is most readily reversible. In many cases the cryoscopic behavior of phenols which do not form oxyacids is abnormal and like that of the alcohols. This is not universally true. W. D. B.

**The action of hydrogen on oxygen in presence of water.** *A. Maricci. Rend. Accad. Lincei* (5) 11, I., 324 (1902). — The author's experiments seem to show that when hydrogen stands in a gasometer over water containing air, the oxygen disappears, presumably having combined with the hydrogen. When the water contains sodium chloride, the oxygen does not disappear. [This is a most extraordinary result and calls for further tests in which the ratio of oxygen to hydrogen should be increased.] W. D. B.

**On the cause of the brown color of ammonium sulphide in presence of a nickel salt.** *U. Antony and G. Magri. Gazz. chim. Ital.* 33, II., 265 (1901). — The authors bring forward experimental evidence in favor of the view that the brown color observed in ammoniacal nickel sulphide solutions is due to the presence of colloidal  $\text{NiS}_4$ . W. D. B.

#### *Osmotic Pressure and Diffusion*

**Osmotic studies on Infusoria.** *P. Enriques. Rend. Accad. Lincei* (5) 11, I., 340, 392, 440 (1902). — The author points out that if animals were necessarily isotonic with the surrounding medium, it would be impossible for them to change from salt-water to fresh water unless they swelled to say ten times their normal value. From this we must conclude that the membranes cannot be impermeable to salts when an animal can live in water of varying concentrations. Experiments with *Infusoria* showed that they first contracted and then expanded on being put in a solution more concentrated than their normal. This was not always easy to observe because the *Infusoria* can only withstand

slight changes of concentration and therefore usually die. These successive changes were shown clearly by weighing *Limnaeae* at different times.

W. D. B.

**The preparation of cells for the measurement of high osmotic pressures.** *H. N. Morse and J. C. W. Frazer. Am. Chem. Jour.* 28, 1 (1902).—The authors have succeeded in improving their method for making cells with semipermeable membranes (6, 506) and their cells will now stand thirty-three atmospheres pressure. A preliminary experiment with a  $n/2$  sugar solution gave a pressure of 13–14 atm, while the osmotic pressure of a normal solution is above 31.4 atm.

W. D. B.

**New osmotic membranes prepared by the electrolytic process.** *H. N. Morse. Am. Chem. Jour.* 29, 173 (1902).—A preliminary announcement to the effect that the author has prepared electrolytically diaphragms of the ferrocyanides of zinc, cadmium, manganese, and uranyl; of the phosphates of copper and uranyl; and of the hydroxides of iron and aluminum. It is proposed to study these in detail later.

W. D. B.

#### Velocities

**On the reciprocal effect of two catalytic reactions in the same medium.** *A. Coppadoro. Gazz. chim. Ital.* 31, I., 425 (1901).—The author has studied the action of hydrochloric acid on sugar solutions and methyl acetate solutions separately and when mixed. If corrections are made for the concentrations of the sugar and the methyl acetate, it is found that each reaction takes place in the mixture independently of the other.

W. D. B.

**Rate of hydration of metaphosphoric acid.** *C. Montemartini and U. Egidi. Gazz. chim. Ital.* 31, I., 394 (1901).—The authors find that the rate of hydration of metaphosphoric acid can be expressed by the formula for monomolecular reaction. They have overlooked the fact that this result was obtained by Sabatier in 1888.

W. D. B.

**Rate of hydration of pyrophosphoric acid.** *C. Montemartini and U. Egidi. Gazz. chim. Ital.* 32, I., 381 (1902).—The reaction between pyrophosphoric acid and water, forming phosphoric acid, was shown to be of the first order.

W. D. B.

**Decomposition of bromacetates by different bases in different alcoholic solutions.** *A. Schweinberger. Gazz. chim. Ital.* 31, II., 321 (1901).—The author studied the decomposition of the bromacetates at 60° in different solvents. The constants are given in the following table:

Solvent	NaOH	KOH	NaOCH <sub>3</sub>	NaOC <sub>2</sub> H <sub>5</sub>	NaOC <sub>3</sub> H <sub>7</sub>	NH <sub>4</sub> OH
Water,	0.82	0.98	—	—	—	2.3
CH <sub>3</sub> OH	0.75	0.70	0.32	0.37	0.55	0.75
C <sub>2</sub> H <sub>5</sub> OH	0.54	0.60	0.59	0.54	0.39	0.33
C <sub>3</sub> H <sub>7</sub> OH	—	—	1.7	—	—	—

The action of methyl alcohol and of sodium methylate is irregular. The high value for ammonia in water is attributed by the author to the accelerating action of ammonium bromide, though no reason is given why this substance should act in this way.

W. D. B.

The inactivity of lipase towards the salts of certain acid ethers considered in the light of the theory of electrolytic dissociation. *J. H. Kastle. Am. Chem. Jour.* 27, 481 (1902). — While lipase accelerates the rate of hydrolysis of di-ethyl succinate by water, it has no effect in the case of sodium ethyl succinate. This was found, on investigation, to be a general phenomenon. No satisfactory explanation could be found. *W. D. B.*

#### *Electromotive Forces*

Current electrochemical theories. *L. Kahlenberg. Trans. Am. Electrochemical Soc.* 1, 119 (1902). — The point is made that there are fewer variables in the case of the electrolysis of a fused salt than in the case of the electrolysis of a solution of a salt. For that reason it would seem desirable to understand the behavior of the simple case before trying to discuss the effect due to the solvent. This is the more essential since Lorenz has called attention to the unexpected phenomena attending the electrolysis of fused salts. *W. D. B.*

Differences of potential between metallic cadmium and solutions of cadmium iodide in various solvents. *L. Kahlenberg. Trans. Am. Electrochemical Soc.* 2, 89 (1902). — The 'single potential' difference between cadmium and *n/10* cadmium iodide varies from + 0.479 volt in normal propylamine to - 0.049 volts in lactic acid nitrile. The changes appear to be connected with the chemical affinity between the solvent and solute. *W. D. B.*

The reversible copper oxide plate. *W. McA. Johnson. Trans. Am. Electrochemical Soc.* 1, 187 (1902). — From a study of the electromotive force of a copper oxide plate during discharge, the author deduces the existence of the oxides  $\text{Cu}_2\text{O}$ ,  $\text{CuO}$ ,  $\text{Cu}_2\text{O}_3$ . *W. D. B.*

Thermodynamical note on the theory of the Edison accumulator. *E. F. Roever. Trans. Am. Electrochemical Soc.* 1, 195 (1902). — A discussion of the theory of the Edison storage battery on the assumption that it is an oxygen-lift cell. As the author has not had an Edison cell with which to experiment, it was impossible for him to check his deductions. *W. D. B.*

A novel concentration cell. *H. S. Carhart. Trans. Am. Electrochemical Soc.* 1, 105 (1902). — In the cell  $\text{Ni} \mid c_1\text{NiSO}_4 \mid c_2\text{NiSO}_4 \mid \text{Ni}$  the current flows in the opposite direction from that predicted by the theory. [This has since been found to be due to the action of the air.] *W. D. B.*

The thermoelectric theory of concentration cells. *H. S. Carhart. Trans. Am. Electrochemical Soc.* 2, 123 (1902). — In cases where there is no chemical reaction, the electromotive force of a cell must be given by the temperature coefficient term in Helmholtz's equation and the sum of the thermoelectric forces at the various junctions must be the electromotive force of the cell. Since the potential difference in a concentration cell is a function of the concentrations, it follows that the thermoelectric force at the junctions between metal and electrolyte must change with the concentration. The author finds this to be the case; but, curiously enough, looks upon it as an argument against the osmotic pressure theory of the cell. *W. D. B.*

**Voltaic cells with fused electrolytes.** *E. A. Byrnes. Trans. Am. Electrochemical Soc. 2, 113 (1902).* — Measurements of electromotive force in fused caustic soda.  
W. D. B.

**An electrochemical paradox.** *C. Hering. Trans. Am. Electrochemical Soc. 2, 139 (1902).* — Water was electrolyzed between platinum electrodes placed close together in a glass tube connected with a manometer. The current was kept constant and the voltage dropped from 1.9 volts at one atmosphere to 0.29 volt at 15 atmospheres, remaining practically the same until the tube broke at about 23 atmospheres pressure. The drop in voltage is due to the depolarization at the electrodes.  
W. D. B.

**Electrochemical polarization.** *J. W. Langley. Trans. Am. Electrochemical Soc. 2, 255 (1902).* — The author defines polarization as "the instantaneous value of the counter-electromotive force existing during the passage of the electrolyzing current." With platinum electrodes in 10 percent aqueous potassium sulphate a maximum counter-electromotive force of 2.45 volts was found. With  $n/5$  and  $n/10$   $H_2SO_4$  the value was about 1.8 volts; and with 10 percent potassium chloride, just over 2.0 volts. Using a carbon anode and iron cathode in fused sodium chloride at  $900^\circ$ , 2.0 volts were obtained, and 3.0 volts with fused potassium chloride at  $825^\circ$ . With alumina dissolved in melted cryolite at  $1010^\circ$ , the counter-electromotive force was only 1.2 volts; but this is probably due to the iron becoming passive.  
W. D. B.

**The nascent state.** *C. J. Reed. Trans. Am. Electrochemical Soc. 1, 69 (1902).* — The author objects to the phrase "nascent state". A number of interesting experiments are described with a cell made up of two solutions separated by a porous cup, the anode solution being always hydrochloric acid and the cathode solution a mixture of salts of metal less noble than copper. A copper cathode was used and different metals as anodes. With tin as anode, hydrogen is set free at the cathode; with lead as anode, some metallic tin is precipitated along with the hydrogen; with an anode of cadmium, lead, tin, and hydrogen are set free; with an anode of zinc, cadmium, lead, iron, tin, and hydrogen are deposited; with an anode of sodium or potassium, zinc, cadmium, lead, iron, tin, and hydrogen are precipitated. It is not stated whether the metals precipitate simultaneously or successively; but this would vary with the current density, the relative concentrations and the degree of stirring. The experiments illustrate the fact that a reaction can take place only so long as the potential of the reacting substances is higher than that of the reacting products.  
W. D. B.

**A zinc-bromide storage battery.** *H. H. Dow. Trans. Am. Electrochemical Soc. 1, 127 (1902).* — A cell with zinc and carbon electrodes in bromine water plus bromine is said to give a very constant voltage of 1.7 volts and to be readily reversible.  
W. D. B.

**Storage battery invention.** *H. Rodman. Trans. Am. Electrochemical Soc. 2, 177 (1902).* — A discussion of the relative merits of the lead and the Edison batteries, in which reasons are given for preferring the lead battery. It is stated that a battery better than the ones now in use would control practically all city traffic not on rails.  
W. D. B.

**On the effect of electrification on the rate of vaporization.** *A. Pochettino. Rend. Accad. Lincei (5) 11, I., 376 (1902).*—With a cathetometer the author measured the change in vertical diameter of a drop perched on the top of a vertical rod. The effect due to electrification was perceptible and showed itself as a decrease in the rate of vaporization. This is the effect to be predicted from the change of surface tension and of vapor-pressure. *W. D. B.*

*Electrolysis and Electrolytic Dissociation*

**Observations on the electrolytic precipitation of zinc and copper.** *E. F. Smith. Jour. Am. Chem. Soc. 24, 1073 (1902).*—Zinc can be precipitated from a solution containing sodium acetate if one neutralizes with ammonia when the hydrogen begins to come off in quantity. Zinc in zinc blende and copper in chalcopyrite can easily be determined electrolytically. In the latter case some iron is found in the copper if a platinum dish is used as cathode but none when platinum cylinders are used as beakers. *W. D. B.*

**The electrolytic estimation of bismuth and its separation from other metals.** *A. L. Kammerer. Jour. Am. Chem. Soc. 25, 83 (1903).*—Working at about 50° with a current density of 0.02 amp/qdm, it is possible to precipitate bismuth satisfactorily from a solution containing 1 cc nitric acid (sp. gr. 1.42), 2 cc of sulphuric acid (sp. gr. 1.84), and 1 g potassium sulphate per 150 cc of solution. There is no difficulty in separating bismuth from zinc, cadmium, chromium, nickel, cobalt, manganese, or uranium; but special precautions must be taken when iron is present. *W. D. B.*

**Separation of lead from manganese by electrolysis.** *A. F. Linn. Am. Chem. Jour. 29, 82 (1903).*—To a solution of lead and manganese nitrates there are added sodium hydrogen phosphate and free phosphoric acid. When electrolyzed with a low current density, lead alone precipitates at the cathode. It takes sixteen to seventeen hours to precipitate 0.1 g lead. *W. D. B.*

**The electrical reduction of lead.** *P. G. Salom. Trans. Am. Electrochemical Soc. 1, 87 (1902).*—A brief description of the process in use at Niagara Falls for preparing spongy lead by the electrolytic reduction of a galena cathode. *W. D. B.*

**The manufacture of bisulphide of carbon in the electric furnace.** *E. R. Taylor. Trans. Am. Electrochemical Soc. 1, 115; 2, 185 (1902).*—A brief account of the author's process for making carbon bisulphide by heating carbon and sulphur in the electric furnace. The process is a continuous one and the furnaces are 16 feet in diameter and 41 feet high. *W. D. B.*

**Continuous electrolysis of solutions of metals.** *N. S. Keith. Trans. Am. Electrochemical Soc. 1, 131 (1902).*—When one is precipitating a metal, using an insoluble anode, the current density must be decreased as the concentration of the metal becomes less. Instead of doing this by decreasing the current, which involves inefficiency, the author increases the size or number of the electrodes in the tanks to which the dilute solutions are taken for electrolysis. *W. D. B.*

**A method of electrolytic production of zinc from its ores.** *S. S. Sadtler.*

*Trans. Am. Electrochemical Soc.* 1, 141 (1902).—The author proposes leaching zinc out as sodium zincate by means of an electrolytically prepared sodium hypochlorite solution and then precipitating the zinc from the zincate electrolytically. *W. D. B.*

**Caustic alkalies and chlorine by the dry electrolytic process.** *C. E. Acker. Trans. Am. Electrochemical Soc.* 1, 165 (1902).—The electrolyte is fused sodium chloride, the anodes are graphite, and the cathode is molten lead. There are four anodes each carrying 2000 amperes and the voltage is 7 volts. The sodium is constantly removed as fused anhydrous caustic and the circulation kept up by blowing steam through the fused lead in what would be the cathode chamber if there were one. *W. D. B.*

**Note on the preparation of metallic lithium.** *S. A. Tucker. Jour. Am. Chem. Soc.* 24, 1024 (1902).—In this modification of Bunsen and Matthiessen's process there is an asbestos partition in a porcelain crucible. The anode is carbon and the cathode an iron loop with which the molten lithium is fished out of the melt. The lithium cathode is kept fused by a gas jet and a current of 5-7 amperes is used. *W. D. B.*

**Note on the Gladstone-Tribe couple.** *W. D. Bancroft. Trans. Am. Electrochemical Soc.* 1, 65 (1902).—Some of the results obtained by Gladstone and Tribe with their couple have been duplicated by means of a pair of zinc or copper plates and an external current. Potassium chlorate is reduced without evolution of hydrogen and the chlorine is taken out of chloroform. *W. D. B.*

**Preparation of *n*-methyl granatanine by electrolytic reduction of *n*-methyl granatonine.** *A. Piccinini. Gazz. chim. Ital.* 32, 1 260 (1902).—In concentrated sulphuric acid there is no difficulty in reducing *n*-methyl granatonine electrolytically to *n*-methyl granatanine. *W. D. B.*

**An electrolytic study of pyroracemic acid.** *G. W. Rockwell. Jour. Am. Chem. Soc.* 24, 719 (1902).—The following compounds have been detected as a result of the electrolytic oxidation and reduction of pyroracemic acid: acet-aldehyde, acetic acid, acetic ester, and lactic acid. It is believed that diacetyl and propionic acid may be formed. Up to 60 percent of the theoretical yield of aldehyde was obtained and up to 28 percent of lactic acid. *W. D. B.*

**On the electrolytic reduction of aromatic nitro-compounds to the corresponding amines.** *A. Chilesotti. Gazz. chim. Ital.* 31, II., 567 (1901).—Reviewed (6, 206) from *Zeit. Elektrochemie*, 7, 768 (1901).

**The dissolution of soluble metallic anodes.** *W. McA. Johnson. Trans. Am. Electrochemical Soc.* 2, 171 (1902).—The author points out that the successful 'sliming' of silver in copper anodes depends largely on the formation of an alloy having a lower conductivity, which therefore carries much less of the current and which eventually drops off from the anode. [This explanation would be more plausible in case of electrodes carrying more silver than do the copper anodes in actual use.] The 'sliming' of arsenic and antimony, on the other hand, is undoubtedly due to an oxidation of these metals in the converter, so that they are non-conducting spots in the anode plate. This is one of the

great improvements in copper refining since it permits of keeping the solutions pure for an indefinite period. *W. D. B.*

**The phenomenon of the formation of metallic dust from cathodes.** *F. Haber. Trans. Am. Electrochemical Soc.* 2, 189 (1902). — Reviewed (6, 512) from *Zeit. Electrochemie*, 8, 245 (1902).

**The equivalent conductivity of the hydrogen ion derived from transference experiments with hydrochloric acid.** *A. A. Noyes and G. V. Sammet. Jour. Am. Chem. Soc.* 24, 944 (1902). — Experiments with  $n/20$  HCl at  $10^\circ$  and  $20^\circ$  gave 0.15882 and 0.16569 for the transference number of chlorine; with  $n/60$  HCl at  $20^\circ$  and at  $30^\circ$  the values were 0.16743 and 0.17734. The authors deduce 330 as the most probable migration velocity of the hydrogen at  $20^\circ$ . *W. D. B.*

**Measurement of electrolytic diffusion, of transference numbers, and of migration velocities.** *P. Straneo. Rend. Accad. Lincei* (5) 11, I., 58, 171 (1902). — The author passes the electrolyte between two horizontal electrodes placed close together. The difference of potential is measured while a constant current flows. In making the calculations, the author assumes Nernst's theory of diffusion and his theory of electromotive force. Under these circumstances, it would seem simpler to use the Helmholtz theory at once. *W. D. B.*

**On the constitution of certain organic salts of nickel and cobalt as they exist in aqueous solution.** *O. F. Tower. Jour. Am. Chem. Soc.* 24, 1012 (1902). — "Aqueous solutions of nickel and cobalt salts of dibasic organic acids offer greater resistance to the passage of the electric current than solutions of similar salts of the other metals investigated, notably magnesium, and this resistance is exceptionally great in the case of the tartrates and malates of nickel and cobalt. This abnormal behavior of the last-named salts is also confirmed by the results obtained with the freezing-point method for determining molecular weights." *W. D. B.*

**On the basic energy of silver oxide in solution.** *M. G. Levi. Gazz. chim. Ital.* 31, II., 1 (1901). — By direct analysis the author finds that 1 g  $\text{Ag}_2\text{O}$  dissolves in about 15000 g of water. Conductivity measurements, based on the assumption of  $\text{AgOH}$  in solution, gave a value  $100k = 0.0115$  at  $25^\circ$ . At a dilution of 7,000 liters, there is only a little over fifty percent dissociation. As a base silver hydroxide stands between trimethyl amine and methyl diethyl amine; it is much stronger than ammonia. *W. D. B.*

**Contribution to the knowledge of some inorganic acids.** *A. Miolati and E. Mascetti. Gazz. chim. Ital.* 31, I., 93 (1901). — When a strong acid is neutralized by a strong base, the conductivity of the solution will pass through a minimum at the moment of neutralization. With a weak acid there will be an increase of conductivity throughout. With a dibasic acid all combinations or intermediate steps are possible. The author has made experiments with sulphurous, selenious, selenic, telluric, chromic, arsenic, phosphorous, arsenious, boric, iodic, and periodic acids. The resulting curves are very interesting though one cannot always agree with the author in his desire to double formulas. *W. D. B.*

A study of the conductivity of certain salts in water, methyl, ethyl, and propyl alcohol, and in mixtures of these solvents. *H. C. Jones and C. F. Lindsay. Am. Chem. Jour.* 28, 329 (1902). — With potassium iodide, ammonium bromide, strontium iodide, and lithium nitrate in mixtures of ethyl alcohol or methyl alcohol and water, the conductivity passes through a minimum for about 50 percent alcohol. No minimum was found for cadmium iodide. No minimum was found for any salt in mixtures of methyl and ethyl alcohols.

W. D. B.

Separation of the basic and acid functions in solutions of the amino acids by means of formaldehyde. *U. Schiff. Gazz. chim. Ital.* 32, I., 97 (1902). — When formaldehyde is added to a solution of an amino acid, it combines more or less completely with the amino group, changing the electrolyte from an amphoteric one to an acid. The amount of acidity thus produced, depends on the concentration of the amino acid and of the caustic potash used for titration. The author gives the data for a number of amino acids.

W. D. B.

Separation of basic and acid functions in solutions of albuminoids. *U. Schiff. Gazz. chim. Ital.* 32, I., 115 (1902). — Addition of formaldehyde to a neutral solution of egg albumen makes the latter acid (see preceding review).

W. D. B.

The electrolytic rectifier. *C. F. Burgess and C. Hambuechen. Trans. Am. Electrochemical Soc.* 1, 147 (1902). — The authors show that the aluminum plate is covered with an oxide film of high resistance, in which there are a number of holes, and that these holes open and shut with the alterations of the current. The leakage in actual practice with an alternating current is much higher than would be expected from experiments with a direct current. By using aluminum and iron as electrodes in fused sodium nitrate, the authors succeeded in getting an energy efficiency of 80 percent.

W. D. B.

Some phenomena of electrolytic conduction. *C. J. Reed. Trans. Am. Electrochemical Soc.* 2, 235 (1902). — If a current be passed through the system  $\text{Cu} \mid \text{CuSO}_4 \mid \text{H}_2\text{SO}_4 \mid \text{H}_2\text{SO}_4 \mid \text{Pt}$  the volume and concentration of the middle solution will increase, when this solution is separated from the other two by porous diaphragms. The author gives a calculation as to what should happen according to the electrolytic dissociation theory and finds that it does not agree with the facts. He does not take into account, however, the phenomenon of electrical endosmose or the possibility of disturbing factors at the surface between sulphuric acid and copper sulphate.

W. D. B.

Graphite electrodes in electrometallurgical processes. *C. L. Collins, 2nd. Trans. Am. Electrochemical Soc.* 1, 53 (1902). — The author points out the advantages of the Acheson graphite electrodes over other carbon electrodes and calls especial attention to the fact that these can be worked and jointed as though they were wood.

W. D. B.

Electrolysis by an alternating current. *J. W. Richards. Trans. Am. Electrochemical Soc.* 1, 221 (1902). — When an insoluble salt can be formed at the electrodes, there is no reason why there should not be continuous electrolytic decomposition with an alternating current. This is the case, for instance,

with cadmium electrodes in a sodium hyposulphite solution, cadmium sulphide being formed. Other instances are cited. *W. D. B.*

**On the fusion of quartz in the electric furnace.** *R. S. Hutton. Trans. Am. Electrochemical Soc. 2, 105 (1902).*—A description of the author's experiments in making quartz tubes by electric heating of sand. The power at the author's disposal, 50 volts and 500 amperes, was not sufficient to permit of very satisfactory results; but attention was called to the many uses for quartz vessels.

*W. D. B.*

**The efficiency of electric furnaces.** *J. W. Richards. Trans. Am. Electrochemical Soc. 2, 51 (1902).*—The ratio of the heat not lost in radiation to the total heat supplied is the efficiency of the furnace. Since we do not measure the heat lost in radiation and cannot calculate with any accuracy the amount of heat necessary for the process, the figures for efficiency are only approximate. Since the loss by radiation does not increase as rapidly as the mass, the larger the furnace the more efficient it will be.

*W. D. B.*

**Pumps and other accessories in electrolytic plants.** *D. H. Browne. Trans. Am. Electrochemical Soc. 2, 219 (1902).*—A description of pumps, heaters, and evaporators which have and have not been found useful with hot nickel chloride solutions.

*W. D. B.*

**A unit of electrical quantity for use in electrochemical calculations.** *A. H. Cowles. Trans. Am. Electrochemical Soc. 2, 207 (1902).*—One hundred ampere-days liberates one cubic meter of hydrogen under standard conditions or one kilocrith. The unit, one hundred ampere-days, is to be known as a kilocrith Col, the Col standing for the monad atom of electricity. Other derived units are the Colad, Cojoule, and Colore. The author believes that it is not a coincidence that one hundred ampere-days set free one cubic meter of hydrogen.

*W. D. B.*

#### *Dielectricity and Optics*

**On the absorption spectra of chloranilic and bromanilic acids, and of their alkali salts.** *C. Fiorini. Gazz. chim. Ital. 31, I., 33 (1901).*—It was not possible to account for the absorption spectra of chlor- and bromanilic acids and of the potassium and sodium salts on the assumption that the ions alone are colored. As there was no way of determining the amount of color due to the undissociated substance, no quantitative comparison between theory and experiment could be made.

*W. D. B.*

**On the effect of low temperatures on the change of resistance of selenium caused by light.** *A. Pochettino. Rend. Accad. Lincei (5) 11, II., 286 (1902).*—The resistance of a given selenium cell at  $+15^{\circ}\text{C}$  was 31,000 ohms in the dark and 18,000 ohms in sunlight, photoelectric effect 0.4. At  $-185^{\circ}$ , the corresponding figures were 2,600 ohms and 1,900 ohms, photoelectric effect 0.3.

*W. D. B.*

**Chemical action of light.** *G. Ciamician and P. Silber. Rend. Accad. Lincei (5) 10, I., 92, 228 (1901); 11, I., 277; Gazz. chim. Ital. 32, I., 218 (1902).*—Under the influence of light, alcohols react with quinone, forming

quinhydrone and an aldehyde or ketone. With mannite, for instance, *d*-mannose is formed. Under the influence of light, aqueous alcohol reacts with nitrobenzene, forming aniline and ethyl aldehyde. This reaction does not run to an end. With absolute alcohol, the chief product is quinaldine, only a little aniline and no aldehyde being formed. *W. D. B.*

**Chemical action of light.** *G. Ciamician and P. Silber. Rend. Accad. Lincei (5) 11, II., 145; Gazz. chim. Ital. 32, II., 535 (1902).* — The reaction between quinone and ether, alcohol or glycerol, and the other reactions (preceding review) so far as studied take place readily under the influence of the blue end of the spectrum and very slowly or not at all when the light comes from the red end of the spectrum. *W. D. B.*

**Investigations on induced radio-activity.** *A. Sella. Rend. Accad. Lincei (5) 11, I., 57, 242, 369 (1902).* — When a plate of metal is connected to one pole of a friction machine and three needles, arranged in a triangle and normal to the plate, are connected with the pole, the plate becomes radio-active whether charged positively or negatively. When charged positively, it is evident that the air has a great deal to do with it. If a smoky flame be brought near, the soot will settle on the plate, forming Kundt's circles which are also circles of radio-activity. *W. D. B.*

**Studies on induced radio-activity.** *A. Sella. Rend. Accad. Lincei (5) 11, II., 81 (1902).* — When a metal plate is made radio-active by the author's method (preceding review), the intensity of the radio-activity increases with the time of charge, though not proportionally to it. A plate loses 60 percent of its radio-activity in the first two hours; after that more slowly. Experiments were also made with air which had been exposed for different periods to thorium radiations. *W. D. B.*